

# brackitz®

U1 L1  
V2.0

LESSONS



in 2 Dimensions



# Lesson 1: **HOW BIG** in 2 Dimensions?



Students imagine a small creature as the user for future designs and practice comparison, measurement, and estimation as they deepen comprehension 2 dimensions - height and width.

## Objectives:



Students explore two dimensions by imagining a creature and comparing it to common objects to understand size and dimensions. "I can" statements that students should be able to do after completing this lesson include: "I can describe how big something is by using height and width." "I can compare size by thinking about everyday objects." "I can use measurement data to estimate in another unit size." "I can use discussion to come to consensus."

## Vocabulary used in this activity:

height, width, tall, narrow, dimension, realistic, accurate, measurement, unit, conversion, compare, data, height, describe, 2-D (2 dimensions), goal, estimate

## Standards

**ECERS-R** **Language-Reasoning:** Books and pictures, Encouraging children to communicate, Using language to develop reasoning skills | **Activities:** Fine Motor, Art, Math/Numbers

**NGSS** 3-5 ETS1, ETS1.A, ETS1.B

**CCSS-Math** Practice.MP2, Practice.MP5, Practice.MP7, Content.4.MD.A, Content.4.MD.A.1, Content.5.MD.A, Content.5.MD.A.1, Content.4.OA.A.2

**CCSS-ELA** Literacy RI.5.5, Literacy RL 5.4, Literacy SL.4.1

**Time needed:** 35-40 minutes

## Materials and Supplies:

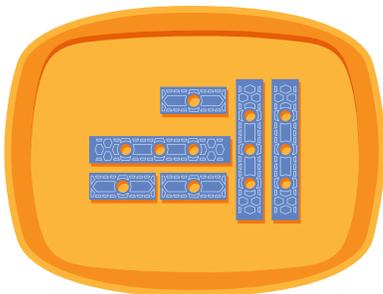
Paper, pencils/crayons, Brackitz planks and 4-way connectors. Each group will each need a ruler. Optional: cookie or playdough to make more tactile figures, tracing paper.

## Setup and preparation:

Have trays, with the same number of planks and connectors for each group of 2-3; help students cooperatively form groups of 2-3 to work together.

## Background knowledge:

Prior to this lesson, the only background knowledge students need is to be able to pick things up and grasp them. Optional pre-activity: Read [The Gingerbread Man](#)



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35-40 minutes



## Whole Class

10 minutes



Holding a small box (half the size of shoe box) share with students, "Let's imagine a creature in here; a small creature that we are going to build things for. S/he is bigger than a bug, but smaller than a bunny. Since our friend is imaginary, we get to decide how big s/he is.

Let's have some discussion about filling in these blanks about comparison, so we all have an idea of how big this creature is:

**Taller than a \_\_\_\_\_.** **Wider than a \_\_\_\_\_.** **Shorter than \_\_\_\_\_ and narrower than \_\_\_\_\_.** Collect all answers on a white board or chart on big paper that the class can refer to.

## Instructor Notes and Tips

Help students compare the figure's size with other things they tangibly understand. Make a chart to capture answers.

Consider items in the classroom as comparators like: blocks, books, pencils, desks.

Work to make sure their choices are logical and fit together, discuss if they do not. "Our creature probably can't be smaller than a mouse and bigger than a dog. Let's talk more specifically about what the thought behind these choices was."

## Group Exploration

5-10 minutes



"Now I want you to draw this creature as close to the real life size as you can. Keep in mind the two dimensions of size we discussed as a group - how tall is s/he? How wide is s/he? Try to make your drawing realistic and accurate."

After students have had a couple of minutes to draw, "Now measure the height and width with a ruler. What is the creature's height? Width?" Have students record.

"Now, look at your Brackitz planks. Estimate how long you think a Brackitz plank is - can you convert your measurements to **Brackitz plank units**? If the creature is so many inches tall, about how many Brackitz planks is that? What about for the width?" Have students record their estimated conversions.

Make sure students are measure height vertically and width horizontally along the standard axes, rather than measuring diagonally or at points that are less than the full height/width.

Help students record measurements, and support students to use a range of strategies for estimating the inches/centimeters to Brackitz unit conversion. They could use finger lengths, eyeing, guessing and adjusting, etc.



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### Group Challenge

15 minutes



"Ok, here is a building task. I want you to build a frame that we could put your picture of the small creature in. The goal is that it shouldn't be too small or too big - it should be just right - fitting but not squeezing the picture. Use the conversions you made to decide how TALL the frame should be in Brackitz pieces and how WIDE it should be. Put your picture away so you have to use your converted measurements for this first build,"

After students have a few minutes to build, "Ok, let's take out your creature pictures. Does it fit without touching the sides? Is it too big with too much empty space around the sides? If it needs changes, add or subtract Brackitz pieces to make it just right."

This is a chance for students to begin building with Brackitz. Watch to make sure groups are able to share ideas and Brackitz pieces functionally. You can try monitoring sharing in the group, or have a timer to help systematize sharing.

### Group Reflection

5 minutes



Bring the whole group back together. "We need to be sure we all know how big our creature is, in the two dimensions we built our rectangle picture frames in today. Let's trace the rectangle you built as a frame into your worksheet and write down what pieces were used and the measurements we made using the rulers. "

Make sure that before you conclude there is some consensus of how BIG the creature is in these two dimensions. Record somewhere that you and students can reference for future class building challenges - how TALL (Using measurements from ruler and Hold up plank, and indicate using holes until class agrees. ) Repeat this question and group answer/consensus building for WIDTH.

### CHALLENGE ADVANCED STUDENTS

**In the group exploration,** "Now that you have a conversion between inches/cm on the ruler and Brackitz planks, estimate your height in Brackitz planks. Then, show your conversion math and see if your estimate was close."

**In the challenge section,** Introduce a criteria for a certain amount of space between the creature and the sides of the frame. Have students calculate what length and width they will need to design for with this added expectation for what counts as a "good" frame.

### SIMPLIFY FOR YOUNGER GROUPS

**In the group exploration,** "Let's measure this box together - first in inches/cm, then with Brackitz planks." Help students understand the conversion by making a chart showing how many inches = 1 plank and vice versa.

**In the challenge section,** You can build a frame that is way too big and have them adjust it and build a frame that's way too small and have them adjust it discussing the dimensions that need to change, and by how much.

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## Student Worksheet

We decided the creature we have in mind is:

Taller than a \_\_\_\_\_. Wider than a \_\_\_\_\_.

Shorter than \_\_\_\_\_ and narrower than \_\_\_\_\_.

Draw the creature in realistic dimensions:



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## Student Worksheet

Record the creature's

Height \_\_\_\_\_ Width \_\_\_\_\_

Convert measurements to **Brackitz planks**

Height \_\_\_\_\_ Width \_\_\_\_\_

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Record the dimensions of the frame in measurements (inches or cm) and in Brackitz pieces:

	Height	Width
Measurements (in or cm)	<input type="text"/>	<input type="text"/>
Brackitz planks	<input type="text"/>	<input type="text"/>